Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	10/815,896	GAT ET AL.	
	Examiner	Art Unit	
	Yubin Hung	2624	

All Participants:

(1) *Yubin Hung*.

(2) *Mark Van Ness*.

Status of Application: *Pending*

(3) _____.

(4) _____.

Date of Interview: *19 December 2007*

Time: *1P*

Type of Interview:
☒ Telephonic
☐ Video Conference
☐ Personal (Copy given to: ☐ Applicant ☐ Applicant's representative)

Exhibit Shown or Demonstrated: ☐ Yes ☐ No
If Yes, provide a brief description:

Part I.

Rejection(s) discussed:

Claims discussed:
1-30

Prior art documents discussed:

Part II.

SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:
See Continuation Sheet

Part III.

☐ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.
☐ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

(Examiner/SPE Signature)

(Applicant/Applicant's Representative Signature – if appropriate)

Continuation of Substance of Interview including description of the general nature of what was discussed: Discussed proposed examiner's amendment. (A Word copy summarizing the essence of the discussion was subsequently e-mailed to Mr. Van Ness on 01/03/07 from whom comments and a published paper by Mr. Gat, "A branch-and-bound technique for nano-structure image segmentation," IEEE Proc. 2003 Conference on CVPR Workshop, June 2003, pp. 1-6, were receivedon 01/07/08 in an e-mail. See attachments for the summary and the comments).

Attachment A: Summary of 12/19/07 interview

(e-mailed 01/03/07)

Examiner Suggested Amendment for 10/815,896

Claims:

1. A method comprising inserting one or more states, each comprising a set of image segmentations and having a priority representing a bound for a quality of each of its image segmentations, into a queue ordered by the priority;

iteratively repeating the following:

extracting the state in the queue having the highest priority;

if the extracted state is a terminal state;

halting and outputting the extracted state as a solution;

if the extracted state is not a terminal state:

refining the extracted state into a plurality of states, each having a priority representing a bound for a quality of each of its image segmentations, and

inserting the plurality of states into the queue.

Deleted:
Formatted: Bullets and Numbering
Deleted: a
Deleted: , the queue being
Deleted: , the set of image segmentations . having
Deleted: a priority representing a bound for a quality of the segmentations
Deleted: ,
Deleted: sets of segmentations,
Deleted: of the plurality of sets
Deleted: sets of segmentations
Deleted: , and
Deleted: iteratively repeating the extraction of the state in the queue having the . . . highest priority.

2. The method of claim 1, further comprising identifying a structure in the image based on the solution.

Deleted: output

3. The method of claim 2, wherein the image is an image of a portion of a microelectronic device.

4. The method of claim 3, wherein the structure comprises a wire structure in the microelectronic device.

5. The method of claim 1, wherein an extracted state is a terminal state if the set of segmentations for the state meets a precision standard.

6. The method of claim 1, wherein refining an extracted state comprises producing a set of segmentation sets that form a partition of the extracted state.

7. The method of claim 1, wherein the segmentations of the image are based on one or more geometric models.

8. The method of claim 7, wherein the one or more geometric models represent one or more expected structures in the image.

9. The method of claim 1, wherein the quality represents relative intensity of light on pixels of the image.

10. (Canceled).

11. The imaging system of claim 18, wherein the operation of the imager is directed automatically based on identification of the structure.

12. The imaging system of claim 18, wherein the structure comprises a nano-structure.

13. The imaging system of claim 18, wherein the device under test comprises a microelectronic device.

14. The imaging system of claim 13, wherein the structure comprises a wiring structure in the microelectronic device.

15. The imaging system of claim 14, wherein the one or more models comprise one or more geometric models of expected wiring structures.

16. (Cancel).

Deleted: An imager comprising: . an image receptor to receive an image of a device under test, the image to include . . a structure in the device under test; and . an interface with a processor, the imager to provide data to the processor; . wherein the structure in the device under test is to be identified based on . . comparison of sets of image segmentations with one or more models of expected structures, the . sets of image segmentations to be evaluated using a bound and branch analysis, each of the sets of . image segmentations having a priority representing a bound on a quality of the image.

Deleted: image

Deleted: 10

Deleted: imager

Deleted: 10

Deleted: imager

Deleted: 10 .

Deleted: imager

Deleted: imager

Deleted: The imager of claim 10, wherein the branch and bound technique comprises . ordering sets of image segmentations according to priority and analyzing the set . of image segmentations with the highest priority.

17. The imaging system of claim 18, wherein the quality for a segmentation comprises light intensity homogeneity for the segmentation.

Deleted: imager
Deleted: 16
Deleted: a set of segmentations

Formatted: Bullets and Numbering

18. An imaging system comprising:

an imager, the imager to receive an image of a device under test; and

Deleted: imaging device
Deleted: imaging device

a processing system, the processing system to identify a structure in the image by

evaluating one or more sets (each called a state) of segmentations of the image in relation to one or more models of expected structures, wherein evaluating comprises:

inserting one or more states, each having a priority representing a bound for a quality of each of its image segmentations, into a queue ordered by the priority;

iteratively repeating the following:

extracting the state in the queue having the highest priority;

if the extracted state is a terminal state:

halting and outputting the extracted state as a solution;

if the extracted state is not a terminal state:

refining the extracted state into a plurality of states, each having a priority representing a bound for a quality of each of its image segmentations, and

inserting the plurality of states into the queue.

19. (Cancel).

20. The imaging system of claim 18, wherein a state is a terminal result if the state meets a standard of precision.

21. (Cancel).

22. The imaging system of claim 18, further comprises a focused ion beam tool.

23. (Cancel).

24. The imaging system of claim 13, wherein the imaging system is utilized to analyze the microelectronic device.

25. An article of manufacture comprising:

a machine- readable storage medium storing computer-executable instructions that, when executed by a processing system, cause the processing system to perform operations comprising:

inserting one or more states, each comprising a set of segmentations of an image and having a priority representing a bound for a quality of

Deleted: determining a priority for each of the plurality of sets of segmentations; . wherein the priority for a set represents a bound for a quality of the segmentations in the set, and . analyzing the sets of segmentations according to priority order.

Deleted: The imaging system of claim 18, wherein analyzing the sets of segmentations . according to priority order comprises determining whether the set of . segmentations with the highest priority is a terminal result.

Deleted: 19

Deleted: set of segmentations

Deleted: set

Deleted: The imaging system of claim 19, wherein analyzing the sets of segmentations . further comprises refining the set of segmentations with the highest priority into a . plurality of sets of segmentations if the set of segmentations is not a terminal . result.

Deleted: wherein the imaging system

Deleted: The imaging system of claim 18, wherein the device under test is a . microelectronic device.

Deleted: 18

Deleted: machine accessible

each of its segmentations, into a queue ordered by the priority;
iteratively repeating the following:
extracting the state in the queue having the highest priority;
if the extracted state is a terminal state:
halting and outputting the extracted state as a solution;
if the extracted state is not a terminal state:
refining the extracted state into a plurality of states, each having a priority representing a bound for a quality of each of its segmentations, and
inserting the plurality of states into the queue.

26. The article of manufacture of claim 25, further comprising computer-executable instructions that, when executed by a processing system, cause the processing system to perform operations comprising identifying a structure in the image based on the solution.

27. The article of manufacture of claim 25, wherein refining an extracted state comprises producing a set of states that forms a partition of the extracted state.

28. The article of manufacture of claim 25, wherein the one or more states are based on one or more geometric models.

Deleted: inserting set of image segmentations into a queue, ordering the sets by priority, . . . priority of a set of image segmentations representing a bound for a quality . . . of the segmentations in the set;¶ . . evaluating the set of image segmentations having the highest priority;¶ if the set of image segmentations having the highest priority meets a ¶ termination standard, halting and outputting the set as a solution;¶ if the set of image segmentations having the highest priority does not meet the . termination standard:¶ refining the set of segmentations into a plurality of sets of¶ segmentations, each of the plurality of sets having a priority;¶ inserting the plurality of sets of segmentations into the queue according to . priority; and . repeating the process until a set of image segmentations having the highest . priority meets the termination standard.

Deleted: set of segmentations

Deleted: segmentation sets

Deleted: refined set

Deleted: segmentations of the image

29. The article of manufacture of claim 28, wherein the one or more geometric models represent one or more expected structures in the image.

30. The article of manufacture of claim 25, further comprising computer-executable instructions that, when executed by a processing system, cause the processing system to perform operations comprising evaluating the quality for a segmentation of the image based on intensity of light falling on pixels of the image.

Specification:

P. 9, paragraph 26: replace last two lines with

between the pixels inside the segment of a particular segmentation and the pixels outside that segment.

Deleted: the
Deleted: ation
Deleted: ¶

P. 10, paragraph 29: replace " *I*: S → **R** " with " *I*: SS → **R** "

P. 10, paragraph 30, line 2: replace "segmentation **S**" with "segmentation S"

P. 10, paragraph 31, line 4: replace "segmentation space **S**" with "segmentation space SS"

P. 10, paragraph 31, line 5: replace "$S \subseteq \mathbf{S}$" with "$S \subseteq SS$"

P. 10, paragraph 31, line 6: replace "2^S" with "2^{SS}"

P. 10, paragraph 32, line 2: replace "cells" with "segments"

P. 10, paragraph 32, line 4: replace "2^S" with "2^{SS}"

P. 10, paragraph 33, line 2: replace "in a set" with "and a set"

P. 11, paragraph 36, line 1: replace "states are subsets" with " a state S is a subset"

P. 11, paragraph 36, line 2: replace "segmentation space S" with "segmentation space SS"

P. 11, paragraph 36, line 5: replace "cells" with "segments"

P. 11, paragraph 36, line 7: replace "2^{S}" with "2^{SS}"

Attachment B: Comments from Applicant's representative (Mr. Van Ness)

(Received in a 01/07/08 e-mail)

Application 10/815,896 – Draft of Suggested Amendments

Claims:

Claim 1: Rather than "a queue ordered by the priority" I would suggest "a queue ordered by the priority of each of the one or more states" since each state has a priority and the ordering is according to these priorities. This would also apply to claims 18 and 25.

Claim 20: To match the amendment to claim 18, "a terminal result" should be amended to be "a terminal state". This is more consistent with the text of the specification.

Claim 22: rather than "further comprises", "further comprising".

Specification:

Here are a few minor changes that we discussed to correct the language of certain paragraphs, and an additional error to correct in paragraph 0039.

Paragraph 0007:

[0007] **Figure 1** illustrates an embodiment of a structure ~~subject~~ subjected to imaging;

Paragraph 0010:

[0010] **Figure 4** is a flow chart ~~illustrated~~ to illustrate an embodiment of image segmentation;

Paragraph 0022:

[0022] **Figure 1** illustrates an embodiment of a structure ~~subject~~ subjected to imaging. Figure 1 contains a simplified model for purposes of explanation. Figure 1 shows a particular wire structure **110** that is present in a microelectronic device and an image of this device with noise **120**. In this illustration, the structure is intended to represent a wire with a T-junction, with the lighter colored wire being presented on a darker silicon background. In actual images, the noise level for the image may be high and the structure may be much more difficult to discern. Under an embodiment of the invention, the image **120** is segmented according to models of structures. In this example, the structure is segmented according to geometric models of wiring structures that are expected to found in the image.

Paragraph 0039:

[0039] (2) **Extraction from Queue** - The state at the head of the priority queue is extracted, this state initially being the set of all segmentations ***S***. The state is removed from the queue. If the extracted state is a terminal ~~queue~~ state, the process is halted and the state is output as the solution to the optimization process. Otherwise, the process continues.

Symbolism in Specification

While is it somewhat difficult to see in the cited article, the symbolism utilized is that the segmentation space is in ***bold and italics*** "***S***", while a state is in *italics* "*S*".

For **paragraph 0029**, it appears that the original equation should be modified so that the S is bold and italic:

$$l : \boldsymbol{S} \rightarrow \mathbf{R}$$

Paragraph 0030: Change to remove bold:

"set of segmentations *S*"

Paragraph 0031:

$S \subseteq \boldsymbol{S}$ [correct in original]

$R : 2^{S} \rightarrow 2^{2^{S}}$ [change S's to ***bold and italic***]

$S \rightarrow S_1, S_2, ..., S_l$ [correct in original]

Paragraph 0032: S should be ***bold and italic***, and P (representing the array of pixels) should be *italic*:

$$M : 2^{\boldsymbol{S}} \times P \rightarrow 2^{\{1,\ldots,K\}}$$

Paragraph 0036: S should be ***bold and italic***:

$$L : 2^{\boldsymbol{S}} \rightarrow \mathbf{R}$$

Paragraphs 0038 and 0039: These paragraphs are correct. ***S*** (***bold and italic***) represents all segmentations.